

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-243017

(43)Date of publication of application : 07.09.1999

(51)Int. Cl. H01F 27/00

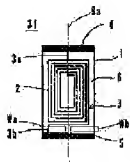
H01F 27/29

H01F 17/00

(21)Application number : 10-045345 (71)Applicant : MURATA MFG CO LTD

(22)Date of filing : 26.02.1998 (72)Inventor : OKUYAMA SHINGO

(54) METHOD FOR RECOGNIZING DIRECTIVITY OF THIN-FILM COIL PART



(57)Abstract:

PROBLEM TO BE SOLVED: To obtain a thin-film coil part for easily identifying directivity without characteristic deterioration, and a method for recognizing the directivity.

SOLUTION: A coil pattern 2 is formed on an insulating substrate 1 through a photolithographic method, and one end part 3a and the other end part 3b of a spiral-shaped coil 3 formed of the coil pattern 2 are respectively led out to thermals 4 and 5 formed at both the end parts of an insulating substrate 1. The terminal 3b is formed in a left side region related to one symmetrical axis 9a of the insulating substrate 1. The position of the terminal part 3b related to the symmetrical axis 9a of the insulating substrate 1 is detected, so that the directivity of a thin-film coil part 31 is recognized.

LEGAL STATUS

[Date of request for examination] 20.03.1998

[Date of sending the examiner's
decision of rejection]

[Kind of final disposal of
application other than the
examiner's decision of rejection or
application converted registration]

[Date of final disposal for
application]

[Patent number] 3011174

[Date of registration] 10.12.1999

[Number of appeal against
examiner's decision of rejection]

[Date of requesting appeal against
examiner's decision of rejection]

[Date of extinction of right]

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CLAIMS

[Claim(s)]

[Claim 1] The thin film mold coil component with which while was divided into two with the symmetry axis of said insulating substrate, and either of said cash-drawer sections is characterized by being unevenly distributed in the side while forming a coil pattern on an insulating substrate, constituting a coil and the two cash-drawer sections of this coil being pulled out by two edges of said insulating substrate, respectively.

[Claim 2] The thin film mold coil component characterized by changing the pattern area of said cash-drawer section which while was divided into two with the symmetry axis of said insulating substrate, and was

arranged in the side, and the pattern area of said cash-drawer section arranged in the another side side while forming a coil pattern on an insulating substrate, constituting a coil and the two cash-drawer sections of this coil being pulled out by two edges of said insulating substrate, respectively.

[Claim 3] The thin film mold coil component characterized by the thing which while was divided into two with the symmetry axis of said insulating substrate, and was arranged in the side while forming the coil pattern on the insulating substrate, constituting the coil and the two cash-drawer sections of this coil being pulled out by two edges of said insulating substrate, respectively, and which pulled out and prepared the dummy electrode for recognition near the section.

[Claim 4] The directivity recognition approach of the thin film mold coil component according to claim 1 or 2 characterized by irradiating light at said cash-drawer section, detecting said cash-drawer section from the reflected light, and recognizing the directivity of a thin film mold coil component based on the location.

[Claim 5] The directivity recognition approach of the thin film mold coil component according to claim 3 characterized by irradiating light at said dummy electrode for recognition, detecting said dummy electrode for recognition from the reflected light, and recognizing the directivity of a thin film mold coil component based on the location.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to a thin film mold coil component and its directivity recognition approach.

[0002]

[Description of the Prior Art] In recent years, the electronic parts of the surface mount type directly mounted in the pattern side of a printed circuit board are widely used with the miniaturization of electronic equipment, and automation of a production process. The user is provided with these electronic parts with the gestalt which held on the tape made of paper (taping), and usually looped the reel around it, and the gestalt held in the tubed cartridge. And in the user side, an automatic machine is loaded with said reel and cartridge, and electronic parts are mounted in a printed circuit board with this automatic machine.

[0003] By the way, even if it is in the surface mount type electronic parts of this kind, what has directivity including diode or a transistor exists variously. Thus, on the relation generally mounted in a printed circuit board by the automaton, the electronic parts of the surface mount mold which has directivity arrange the directivity which it has in the fixed direction, are taped, or are held in a cartridge and supplied to the user.

[0004] For example, even if it is in the thin film mold coil component 7 of the surface mount type shown in drawing 8 , the terminal 4 by the side of the volume start of a coil 3 and the terminal 5 by the side of the end of a volume are identified, the direction is arranged and taped, or it holds in a cartridge and the user is supplied. This coil component 7 carries out the laminating of the coil pattern 2 and the insulating resin layer 6 by turns on an insulating substrate 1, and spiral-like end section 3a (the coil 3 is insulated.) and other end 3b of a coil 3 which are formed with this coil pattern 2 are pulled out by the terminals 4 and 5 formed in the both ends of an insulating substrate 1, respectively, respectively.

[0005] As the discernment approach of the directivity of this kind of thin film mold coil component 7, conventionally, as shown in drawing 9 or drawing 10 , it is technique, such as printing and baking, and the marking 8 for recognition is beforehand given to the top face of the thin film mold coil component 7, the image of the thin film mold coil component 7 is captured to an image processing system, and, generally the method of this image processing system detecting marking 8, and discriminating the directivity of the thin film mold coil component 7 from that location is learned. This approach binary--ization-processes the captured image with an image processing system. The window (field) which has the respectively same area as the left-hand side of symmetry-axis 9a run to the longitudinal direction of the image and right-hand side (in the case of drawing 9) or a symmetry-axis 9b top, and the

bottom (in the case of drawing 10) is set up. By carrying out the comparison operation of the number of the white pixels in these windows, and the number of black pixels, it identifies whether marking 8 exists in [of these two windows] which window, and the directivity of the thin film mold coil component 7 is identified.

[0006] Furthermore, as shown in drawing 11 , the method of identifying the directivity of the thin film mold coil component 7 is also thought out with secret using only one numbers of the coil pattern 2 which constitutes a coil 3 surely differing left-hand side and on the right-hand side of symmetry-axis 9a which runs to the longitudinal direction of the insulating substrate 1 of the shape of a rectangle of the thin film mold coil component 7. That is, by this discernment approach, the image which incorporated the thin film mold coil component 7 of drawing 8 to the image processing system, and was captured by this image processing system is binary--ization-processed, the windows (field) Wa and Wb which have the respectively same area as the left-hand side and right-hand side of symmetry-axis 9a which are run to the longitudinal direction of the image are set up, respectively, and comparison-operation processing of the number of these windows Wa and the white pixels in Wb and the number of black pixels is carried out. Since only one numbers of the spiral-like coil pattern 2 surely differ in the left-hand side window Wa and the right-hand side window Wb at this time so that drawing 11 may also show, in the left-hand side window Wa and the right-hand side window Wb, a difference arises in the number of the white pixel contained in that interior, or black pixels, and the directivity of said thin film mold coil component 7 can be identified by comparing that size.

[0007]

[Problem(s) to be Solved by the Invention] By the way, by the approach of drawing 9 which identifies the directivity of the thin film mold coil component 7 with the location of marking 8, or drawing 10 , in order to give marking 8 to the thin film mold coil component 7, printing of marking 8 and the process of printing were needed, and there was a problem that the manufacturing cost of the thin film mold coil component 7 became high. Moreover, when the carbon metallurgy group etc. contained in the ingredient of marking 8, as shown in drawing 12 , marking, with a coil 3, the magnetic flux ϕ to generate was intercepted by marking 8, and there was a problem that the inductance value of the thin film mold coil component 7 became small.

[0008] on the other hand, by the approach of drawing 11 which measures the number of the coil pattern 2 in the left-hand side window Wa, and

the number of the coil pattern 2 in the right-hand side window Wb If the number of turns of a coil 3 increases as shown in drawing 13 , indeed again As the configuration of the thin film mold coil component 7 becomes small, the difference of the number of the white pixels in the left-hand side window Wa (or black pixel) and the number of the white pixels in the right-hand side window Wb (black pixel) becomes smaller. The judgment of the directivity of the thin film mold coil component 7 became difficult, and there was a problem that the dependability of a directivity judging fell.

[0009] Then, the purpose of this invention is to offer the thin film mold coil component which can identify directivity without degradation of a property easily, and its directivity recognition approach.

[0010]

[Means for Solving the Problem] In order to attain said purpose, while the thin film mold coil component concerning this invention forms a coil pattern on an insulating substrate, and constitutes a coil and the two cash-drawer sections of this coil are pulled out by two edges of said insulating substrate, respectively, while was divided into two with the symmetry axis of said insulating substrate, and either of said cash-drawer sections is characterized by being unevenly distributed in the side. Or while forming a coil pattern on an insulating substrate, constituting a coil and the two cash-drawer sections of this coil being pulled out by two edges of said insulating substrate, respectively, it is characterized by changing the pattern area of said cash-drawer section which while was divided into two with the symmetry axis of said insulating substrate, and was arranged in the side, and the pattern area of said cash-drawer section arranged in the another side side. And the directivity recognition approach of these thin film mold coil components irradiates light at the cash-drawer section, detects said cash-drawer section from the reflected light, and is characterized by recognizing the directivity of a thin film mold coil component based on the location.

[0011] Moreover, the thin film mold coil component concerning this invention is characterized by the thing which while was divided into two with the symmetry axis of said insulating substrate, and was arranged in the side and which pulled out and prepared the dummy electrode for recognition near the section while forming a coil pattern on an insulating substrate, constituting a coil and the two cash-drawer sections of this coil being pulled out by two edges of said insulating substrate, respectively. And the directivity recognition approach of this thin film mold coil component irradiates light at the dummy electrode for recognition, detects said dummy electrode for recognition

from that reflected light, and is characterized by recognizing the directivity of a thin film mold coil component based on that location.
[0012]

[Function] If light carries out incidence to the cash-drawer section of a coil, or the dummy electrode for recognition, the light will be reflected efficiently. Therefore, and if this is picturized, compared with the image of the field of others [image / of the field of the cash-drawer section or the dummy electrode for recognition], brightness will be high and will become bright than the amount of the light to which the light which returns from the cash-drawer section or the dummy electrode for recognition returns from other fields. It can pull out by detecting this, the location of the section or the dummy electrode for recognition can be detected, and the directivity of a thin film mold coil component can be discriminated from the physical relationship of the cash-drawer section to the symmetry axis of an insulating substrate, or the dummy electrode for recognition.

[0013]

[Embodiment of the Invention] Hereafter, the gestalt of operation of the thin film mold coil component concerning this invention and its manufacture approach is explained with reference to an attached drawing. In each operation gestalt, the same sign was given to the same components and the same part.

[0014] The 1st operation gestalt of [the 1st operation gestalt, drawing 1 - drawing 3] explains the thin film mold coil component which prepared the dummy electrode for recognition. As shown in drawing 1 , on an insulating substrate 1, spiral-like end section 3a (the coil 3 is insulated.) and other end 3b of a coil 3 which form the coil pattern 2 and the transparent (or translucent) insulating resin layer 6 by turns by the photolithography method, and are formed with this coil pattern 2 are pulled out by the terminals 4 and 5 formed in the both ends of an insulating substrate 1, respectively, and the thin film mold coil component 21 comes. On the insulating resin layer 6, the dummy electrode 22 for recognition is formed in a right-hand side field about one symmetry-axis 9a of an insulating substrate 1. Glass, crystallized glass, an alumina, a ferrite, etc. are used as an ingredient of an insulating substrate 1. Ag, Ag-Pd, Cu, nickel, etc. are used as an ingredient of a coil 3 or the dummy electrode 22 for recognition.

[0015] The thin film mold coil component 21 can be formed as follows, for example. After forming the electrode layer by sputtering in the top face of an insulating substrate 1 and applying a photosensitive resist, it leaves the resist film of a coil pattern configuration on a spatter

electrode layer by exposing in piles the photo mask with which the predetermined image pattern was formed, and developing it. Furthermore, etching removes an excessive spatter electrode layer and the desired coil pattern 2 is formed by exfoliating the resist film further. Next, the insulating resin layer 6 is formed by the photolithography method like the case where the coil pattern 2 is formed. That is, a liquefied insulating ingredient is applied to the whole surface of the top face of an insulating substrate 1, it dries, and the insulating resin layer 6 is formed. The thing of the quality of the material suitable for the photolithography methods, such as for example, photosensitive polyimide resin, is used for an insulating ingredient. Next, the mask film with which the predetermined image pattern was formed in the top face of the insulating resin layer 6 is put, and the part of a request of the insulating resin layer 6 is stiffened at the exposure process of irradiating ultraviolet rays etc. Next, a part for the non-hard spot of the insulating resin layer 6 is removed at a development process, and opening for carrying out the interlayer connection of the coil pattern 2 etc. is formed.

[0016] The coil pattern 2 and the insulating resin layer 6 (6a, 6b) are formed by the photolithography method by turns as occasion demands like the following. The dummy electrode 22 for recognition if the image pattern for forming the dummy electrode 22 for recognition is formed in the photo mask used at this time in case the coil pattern 2 of the outermost layer is formed, as expanded to drawing 2 and shown in it by passing through a development process can be formed.

[0017] If light is irradiated on the front face of the thin film mold coil component 21 with which the dummy electrode 22 for recognition was formed in the top face of insulating resin layer 6a as shown in drawing 3 in graph, light will be efficiently reflected with the dummy electrode 22 for recognition. For this reason, if the thin film mold coil component 21 of drawing 1 is picturized with a CCD camera etc., that image will have the high brightness of the field of the dummy electrode 22 for recognition, and the brightness of other fields will become low. The dummy electrode 22 for recognition is detectable from the difference of this brightness. Therefore, the directivity of the thin film mold coil component 21 can be known by judging whether it is located in which field of the two fields into which the detected dummy electrode 22 for recognition is divided by symmetry-axis 9a of an insulating substrate 1.

[0018] Next, the discernment approach of the concrete direction is explained. First, the image which incorporated the thin film mold coil component 21 shown in drawing 1 to the image processing system with the

CCD camera, and was captured by this image processing system is binary--ization-processed. And the windows Wa and Wb (refer to drawing 1) which have the respectively same area as the left-hand side and right-hand side of symmetry-axis 9a which are run to the longitudinal direction of the binary--ization-processed image are set up. In addition, these windows Wa and Wb are set as the one window Wb so that the image of the dummy electrode 22 for recognition may be contained.

[0019] Subsequently, the number of the white pixels in two Windows Wa and Wb(s) and the number of black pixels are counted, respectively. At this time, in the window Wb containing the image of the dummy electrode 22 for recognition, there are few parts with many amounts of the light which carries out incidence to a CCD camera from the dummy electrode 22 for recognition, and black pixels, and the number which is a white pixel has increased. If counted value of the white pixel in Window Wa is set to Wap and counted value of the white pixel in Window Wb is now set to Wbp, the directivity of the thin film mold coil component 21 of drawing 1 is discriminable with the directivity recognition operation shown below. That is, it is judged with the coil component 21 being arranged to hard flow at the time of $Wbp - Wap < 0$ by which the coil component 21 is arranged in the forward direction at the time of $Wbp - Wap > 0$. In addition, the forward direction and hard flow can also be mutually replaced by any of two terminals 4 and 5 of the thin film mold coil component 21 of drawing 1 this judgment result decides to be the volume start of a coil 3.

[0020] As mentioned above, since the dummy electrode 22 for recognition is formed, a big difference can be given between the number of counts Wap of the white pixel in the window Wa set as the binary-ized screen, and the number of counts Wbp of the white pixel in Window Wb. This does not need the special process or special ingredient for a directivity judging, but it has easy and high dependability, and the directivity of the thin film mold coil component 21 can be recognized.

[0021] While was divided into two with the symmetry axis of an insulating substrate, and, as for the 2nd operation gestalt of [the 2nd operation gestalt, drawing 4 - drawing 6], one cash-drawer section of a coil explains the thin film mold coil component which is unevenly distributed in the side.

[0022] The terminals 4 and 5 with which spiral-like end section 3a (the coil 3 is insulated.) and other end 3b of a coil 3 which form the coil pattern 2 and the transparent insulating resin layer 6 by turns by the photolithography method, and are formed with this coil pattern 2 were formed in the both ends of an insulating substrate 1, respectively come

to pull out the thin film mold coil component 31 shown in drawing 4 on an insulating substrate 1. Edge 3b of a coil 3 is formed in the field of the left-hand side divided with symmetry-axis 9a of an insulating substrate 1 into two right and left.

[0023] Moreover, the thin film mold coil component 41 shown in drawing 5 is formed in the field of the right-hand side where edge 3b of a coil 3 was divided with symmetry-axis 9a of an insulating substrate 1 into two right and left. Furthermore, the thin film mold coil component 51 shown in drawing 6 is the same as that of what made large pattern area of edge 3b of a coil 3 in said thin film mold coil component 31.

[0024] If light is irradiated on the front face of these thin film mold coil components 31, 41, and 51, light will be efficiently reflected with a coil 3. For this reason, if these thin film mold coil components 31, 41, and 51 are picturized with a CCD camera etc., that image will have the high brightness of the field of a coil 3, and the brightness of other fields will become low. Therefore, edge 3b is detectable from the difference of brightness by setting up the windows Wa and Wb (referring to drawing 4 , drawing 5 , and drawing 6) which have the respectively same area as the left-hand side and right-hand side of symmetry-axis 9a so that the image of edge 3b may be contained in the one window Wa or Wb. In this way, by judging whether detected edge 3b is located in which field of the two fields divided by symmetry-axis 9a of an insulating substrate 1, the directivity of the thin film mold coil components 31, 41, and 51 can be known. Also in this case, the algorithm for the thin film mold coil components 31 and 41 and directivity recognition of 51 is completely the same as that of said 1st operation gestalt.

[0025] As shown in [3rd operation gestalt and drawing 7] drawing 7 , the thin film mold coil component 61 of the 3rd operation gestalt changes each pattern area of the edges 3a and 3b of a coil 3. Edge 3b with a large pattern area is arranged in the lower field divided with symmetry-axis 9b of the direction of a shorter side of an insulating substrate 1 into two upper and lower sides, and edge 3a with a narrow pattern area is arranged in the upper field.

[0026] If light is irradiated on the front face of this thin film mold coil component 61, light will be efficiently reflected with a coil 3. For this reason, if the thin film mold coil component 61 is picturized with a CCD camera etc., that image will have the high brightness of the field of a coil 3, and the brightness of other fields will become low. Therefore, edge 3b is detectable from the difference of brightness by setting up the windows Wc and Wd which have the respectively same area as symmetry-axis 9b a top and the bottom so that the image of edge 3b

may be contained in the one window Wd. In this way, by judging whether detected edge 3b is located in which field of the two fields divided by symmetry-axis 9b of an insulating substrate 1, the directivity of the thin film mold coil component 61 can be known. The algorithm for directivity recognition of the thin film mold coil component 61 also in this case is completely the same as that of said 1st operation gestalt. [0027] operation gestalt] besides [-- in addition, this invention is not limited to said operation gestalt, within the limits of the summary, can be boiled variously and can be changed. For example, although there are few parts with many amounts of the light which carries out incidence to a CCD camera from edge 3b or the dummy electrode 22 for recognition, and black pixels and the number which is a white pixel has increased with said operation gestalt in the window Wa containing the image of edge 3b of a coil 3, or the dummy electrode 22 for recognition, or Wb By reversing binary-ized processing of said image captured with the CCD camera, there are many windows Wa containing the image of said edge 3b or the dummy electrode 22 for recognition or black pixels of Wb, and the number which is a white pixel can decrease. At this time, in said directivity judging operation, Wap is made into the number of counts of the black pixel in Window Wa, and it should just make Wbp the number of counts of the black pixel in Window Wb.

[0028] Moreover, although said operation gestalt forms the coil pattern 2 and the insulating resin layer 6 by turns by the photolithography method, it may not necessarily be restricted to this and approaches, such as thick film printing, the sputtering method, and a vacuum deposition method, may be used for it. Furthermore, if edge 3b of a coil 3 and the dummy electrode 22 for recognition are the structures exposed from the insulating resin layer 6, the insulating resin layer 6 does not necessarily need to be a transparent ingredient or a translucent ingredient.

[0029]

[Effect of the Invention] This invention irradiates light at the cash-drawer section of the coil of a thin film mold coil component, or the dummy electrode for recognition so that clearly from the above explanation. Since the location is detected and the directivity of a thin film mold coil component was discriminated from the physical relationship of the cash-drawer section to the symmetry axis of an insulating substrate, or the dummy electrode for recognition Even if the special ingredient for marking for a directivity judging is unnecessary and the consistency of what has many number of turns of a coil, or a coil pattern is high, recognition of directivity is easy, the

dependability of the recognition is high, and the low thin film mold coil component of cost can be obtained. Moreover, according to this invention, the problem on the property which a conventional thin film mold coil component called the fall of the inductance accompanying cutoff of the magnetic flux of the thin film mold coil component by marking for a directivity judging had is also solvable.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The top view showing the 1st operation gestalt of the thin film mold coil component concerning this invention.

[Drawing 2] The explanatory view showing the image in the window of the thin film mold coil component shown in drawing 1 .

[Drawing 3] The mimetic diagram showing the structure of the thin film mold coil component shown in drawing 1 .

[Drawing 4] The top view showing the 2nd operation gestalt of the thin film mold coil component concerning this invention.

[Drawing 5] The top view showing another example of the 2nd operation gestalt of the thin film mold coil component concerning this invention.

[Drawing 6] The top view showing still more nearly another example of the 2nd operation gestalt of the thin film mold coil component concerning this invention.

[Drawing 7] The top view showing the 3rd operation gestalt of the thin film mold coil component concerning this invention.

[Drawing 8] The top view of the conventional thin film mold coil component.

[Drawing 9] The top view of the conventional thin film mold coil component which has a marker for directivity discernment.

[Drawing 10] The top view of one conventional thin film mold coil

component of the now which has a marker for directivity discernment.

[Drawing 11] The explanatory view of the directivity recognition approach of the thin film mold coil component shown in drawing 8 .

[Drawing 12] The explanatory view of the trouble of the conventional thin film mold coil component.

[Drawing 13] The explanatory view of the trouble of the conventional thin film mold coil component.

[Description of Notations]

1 -- Insulating substrate

2 -- Coil pattern

3 -- Coil

3a, 3b -- Edge

6 -- Insulating resin layer

9a, 9b -- Symmetry axis

21, 31, 41, 51, 61 -- Thin film mold coil component

22 -- Dummy electrode for recognition

Wa, Wb, Wc, Wd -- Window

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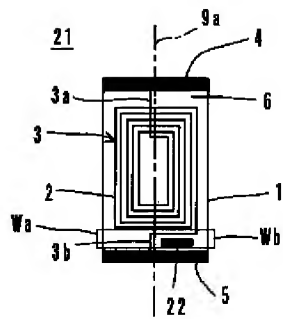
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DRAWINGS

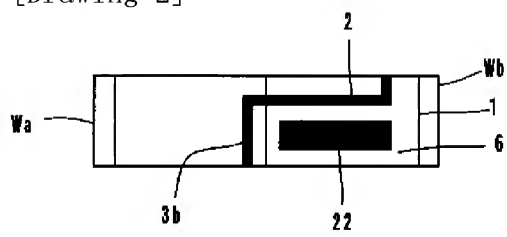
[Drawing 3]



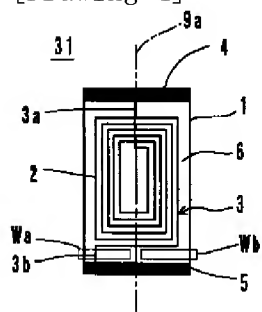
[Drawing 1]



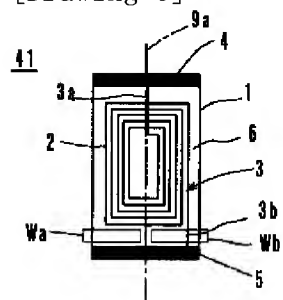
[Drawing 2]



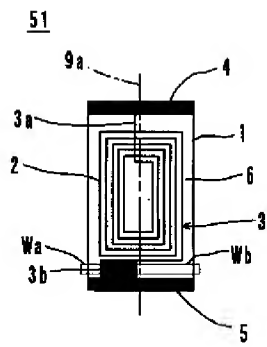
[Drawing 4]



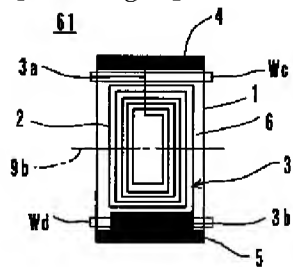
[Drawing 5]



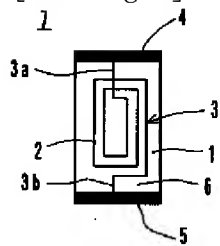
[Drawing 6]



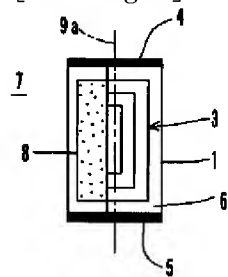
[Drawing 7]



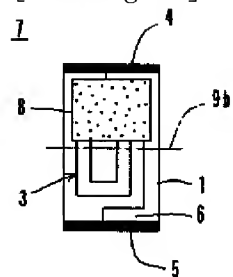
[Drawing 8]



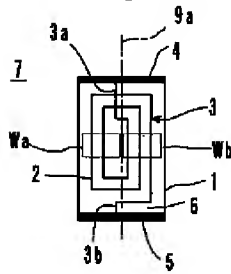
[Drawing 9]



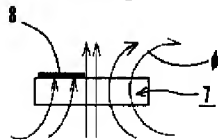
[Drawing 10]



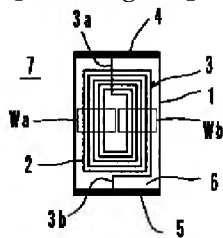
[Drawing 11]



[Drawing 12]



[Drawing 13]



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WRITTEN AMENDMENT

----- [a procedure
revision]

[Filing Date] January 29, Heisei 11

[Procedure amendment 1]

[Document to be Amended] Specification

[Item(s) to be Amended] The name of invention

[Method of Amendment] Modification

[Proposed Amendment]

[Title of the Invention] The directivity recognition approach of a thin film mold coil component

[Procedure amendment 2]

[Document to be Amended] Specification

[Item(s) to be Amended] Claim

[Method of Amendment] Modification

[Proposed Amendment]

[Claim(s)]

[Claim 1] In the directivity recognition approach of the thin film mold coil component which forms a coil pattern on an insulating substrate and comes to constitute a coil,

While the two cash-drawer sections of said coil of said thin film mold coil component are pulled out by two edges of said insulating substrate, respectively To the direction which goes to another side from one side of two edges of said insulating substrate, while was divided into two with the symmetry axis of said parallel insulating substrate, and either of said cash-drawer sections is unevenly distributed in a side. The directivity recognition approach of the thin film mold coil component characterized by irradiating light at said cash-drawer section, detecting said cash-drawer section from the reflected light, and recognizing the directivity of a thin film mold coil component based on the location.

[Claim 2] In the directivity recognition approach of the thin film mold coil component which forms a coil pattern on an insulating substrate and comes to constitute a coil,

While the two cash-drawer sections of said coil of said thin film mold coil component are pulled out by two edges of said insulating substrate, respectively The pattern area of said cash-drawer section which while was divided into two with the symmetry axis of said insulating substrate which intersects perpendicularly from one side of two edges of said insulating substrate to the direction which goes to another side, and was arranged in the side, and the pattern area of said cash-drawer section arranged in the another side side are changed. The directivity recognition approach of the thin film mold coil component characterized by irradiating light at said cash-drawer section, detecting said cash-drawer section from the reflected light, and recognizing the directivity

of a thin film mold coil component based on the location.

[Procedure amendment 3]

[Document to be Amended] Specification

[Item(s) to be Amended] 0001

[Method of Amendment] Modification

[Proposed Amendment]

[0001]

[Field of the Invention] This invention relates to the directivity recognition approach of a thin film mold coil component.

[Procedure amendment 4]

[Document to be Amended] Specification

[Item(s) to be Amended] 0009

[Method of Amendment] Modification

[Proposed Amendment]

[0009] Then, the purpose of this invention is to offer the directivity recognition approach of a thin film mold coil component that directivity is easily discriminable without degradation of a property.

[Procedure amendment 5]

[Document to be Amended] Specification

[Item(s) to be Amended] 0011

[Method of Amendment] Deletion

[Procedure amendment 6]

[Document to be Amended] Specification

[Item(s) to be Amended] 0012

[Method of Amendment] Modification

[Proposed Amendment]

[0012]

[Function] If light carries out incidence to the cash-drawer section of a coil, the light will be reflected efficiently. Therefore, and if this is picturized, compared with the image of the field of others [image / of the field of the cash-drawer section], brightness will be high and will become bright than the amount of the light to which the light which returns from the cash-drawer section returns from other fields. It can pull out by detecting this, the location of the section can be detected, and the directivity of a thin film mold coil component can be discriminated from the physical relationship of the cash-drawer section to the symmetry axis of an insulating substrate.

[Procedure amendment 7]

[Document to be Amended] Specification

[Item(s) to be Amended] 0013

[Method of Amendment] Modification

[Proposed Amendment]

[0013]

[Embodiment of the Invention] Hereafter, the gestalt of implementation of the manufacture approach of the thin film mold coil component concerning this invention is explained with reference to an attached drawing. In each operation gestalt, the same sign was given to the same components and the same part.

[Procedure amendment 8]

[Document to be Amended] Specification

[Item(s) to be Amended] 0029

[Method of Amendment] Modification

[Proposed Amendment]

[0029]

[Effect of the Invention] This invention irradiates light at the cash-drawer section of the coil of a thin film mold coil component so that clearly from the above explanation. Since the location is detected and the directivity of a thin film mold coil component was discriminated from the physical relationship of the cash-drawer section to the symmetry axis of an insulating substrate Even if the special ingredient for marking for a directivity judging is unnecessary and the consistency of what has many number of turns of a coil, or a coil pattern is high, recognition of directivity is easy, the dependability of the recognition is high, and the low thin film mold coil component of cost can be obtained. Moreover, according to this invention, the problem on the property which a conventional thin film mold coil component called the fall of the inductance accompanying cutoff of the magnetic flux of the thin film mold coil component by marking for a directivity judging had is also solvable.

[Translation done.]

(19)日本国特許庁 (J P)

(12) 公 開 特 許 公 報 (A)

(11)特許出願公開番号

特開平11-243017

(43)公開日 平成11年(1999) 9月7日

(51)Int.Cl.⁶

識別記号

F I

H 0 1 F 27/00
27/29
17/00

H 0 1 F 15/00
17/00
15/10

B
B
P

審査請求 有 請求項の数2 O L (全 7 頁)

(21)出願番号 特願平10-45345

(22)出願日 平成10年(1998) 2月26日

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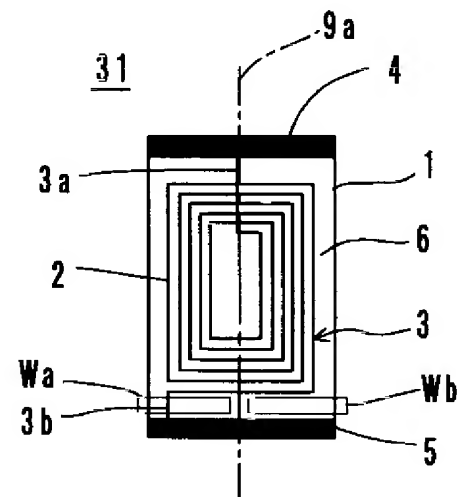
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(54)【発明の名称】 薄膜型コイル部品の方向性認識方法

(57)【要約】

【課題】 特性の劣化なしに方向性を容易に識別することができる薄膜型コイル部品及びその方向性認識方法を得る。

【解決手段】 絶縁基板1上に、フォトリソグラフィ法によりコイルパターン2を形成し、コイルパターン2により形成されるスパイラル状のコイル3の一端部3a及び他端部3bが絶縁基板1の両端部にそれぞれ形成された端子4及び5に引き出されている。絶縁基板1の一つの対称軸9aに関して左側の領域内に端部3bを形成している。絶縁基板1の対称軸9aに関するこの端部3bの位置を検出することにより、薄膜型コイル部品31の方向性を認識する。



【特許請求の範囲】

【請求項1】 絶縁基板上にコイルパターンを形成してコイルを構成し、該コイルの二つの引出し部がそれぞれ前記絶縁基板の二つの端部に引き出されると共に、前記引出し部のいずれか一方が前記絶縁基板の対称軸にて二つに仕切られた一方の側に偏在していることを特徴とする薄膜型コイル部品。

【請求項2】 絶縁基板上にコイルパターンを形成してコイルを構成し、該コイルの二つの引出し部がそれぞれ前記絶縁基板の二つの端部に引き出されると共に、前記絶縁基板の対称軸にて二つに仕切られた一方の側に配設された前記引出し部のパターン面積と他方の側に配設された前記引出し部のパターン面積とを異ならせたことを特徴とする薄膜型コイル部品。

【請求項3】 絶縁基板上にコイルパターンを形成してコイルを構成し、該コイルの二つの引出し部がそれぞれ前記絶縁基板の二つの端部に引き出されると共に、前記絶縁基板の対称軸にて二つに仕切られた一方の側に配設された引出し部の近傍に認識用ダミー電極を設けたことを特徴とする薄膜型コイル部品。

【請求項4】 前記引出し部に光を照射してその反射光から前記引出し部を検出し、その位置に基づいて薄膜型コイル部品の方向性を認識することを特徴とする請求項1又は請求項2記載の薄膜型コイル部品の方向性認識方法。

【請求項5】 前記認識用ダミー電極に光を照射してその反射光から前記認識用ダミー電極を検出し、その位置に基づいて薄膜型コイル部品の方向性を認識することを特徴とする請求項3記載の薄膜型コイル部品の方向性認識方法。

【発明の詳細な説明】**【0001】**

【発明の属する技術分野】本発明は、薄膜型コイル部品及びその方向性認識方法に関する。

【0002】

【従来の技術】近年、電子機器の小型化及び製造工程の自動化に伴い、プリント基板のパターン面に直接、実装される表面実装タイプの電子部品が広く使用されている。これら電子部品は通常、紙製のテープに保持（テーピング）してそれをリールに巻装した形態や、筒状のカートリッジに収容した形態でユーザに提供されている。そして、ユーザ側では、前記リールやカートリッジを自動機に装填し、該自動機により電子部品をプリント基板に実装している。

【0003】ところで、この種の表面実装タイプの電子部品であっても、ダイオードやトランジスタを始めとして方向性を有するものが種々存在する。このように方向性を有する表面実装型の電子部品は、一般に自動機械によりプリント基板に実装される関係上、それが有している方向性を一定の方向に揃えてテーピングされたりカー

トリッジに収容されてユーザに供給されている。

【0004】例えば図8に示される表面実装タイプの薄膜型コイル部品7にあっても、コイル3の巻始め側の端子4と巻終わり側の端子5とを識別し、その方向を揃えてテーピングしたりカートリッジに収容してユーザに供給されている。このコイル部品7は、絶縁基板1上にコイルパターン2と絶縁樹脂層6を交互に積層し、該コイルパターン2により形成されるスパイラル状のコイル3の一端部3a（コイル3とは絶縁されている。）及び他端部3bが絶縁基板1の両端部にそれぞれ形成された端子4及び5にそれぞれ引き出されている。

【0005】この種の薄膜型コイル部品7の方向性の識別方法としては、従来より、図9や図10に示すように、印刷や焼き付け等の手法で、薄膜型コイル部品7の上面に予め認識用マーキング8を付与しておき、薄膜型コイル部品7の画像を画像処理装置に取り込み、該画像処理装置によりマーキング8を検出してその位置から薄膜型コイル部品7の方向性を識別する方法が一般に知られている。該方法は、画像処理装置により、取り込まれた画像を2値化処理し、その画像の長手方向に走る対称軸9aの左側及び右側（図9の場合）もしくは対称軸9bの上側及び下側（図10の場合）にそれぞれ同じ面積を有するウインドウ（領域）を設定し、これらウインドウ内の白ピクセルの数と黒ピクセルの数とを比較演算することにより、これら二つのウインドウのうちのいずれのウインドウ内にマーキング8が存在しているかを識別し、薄膜型コイル部品7の方向性を識別するものである。

【0006】さらに、図11に示すように、薄膜型コイル部品7の長方形の絶縁基板1の長手方向に走る対称軸9aの左側と右側とでは、コイル3を構成するコイルパターン2の本数が必ず1本だけ異なることを利用して、薄膜型コイル部品7の方向性を識別する方法も非公開ながら案出されている。すなわち、該識別方法では、図8の薄膜型コイル部品7を画像処理装置に取り込み、該画像処理装置に取り込まれた画像を2値化処理し、その画像の長手方向に走る対称軸9aの左側及び右側にそれぞれ同じ面積を有するウインドウ（領域）Wa及びWbをそれぞれ設定し、これらウインドウWa及びWb内の白ピクセルの数と黒ピクセルの数とを比較演算処理する。このとき、図11からも分かるように、スパイラル状のコイルパターン2の本数が左側のウインドウWaと右側のウインドウWbとで必ず1本だけ異なるので、左側のウインドウWaと右側のウインドウWbとではその内部に含まれている白ピクセルもしくは黒ピクセルの数に差が生じ、その大小を比較することにより、前記薄膜型コイル部品7の方向性を識別することができる。

【0007】

【発明が解決しようとする課題】ところで、マーキング8の位置により薄膜型コイル部品7の方向性を識別する

図9もしくは図10の方法では、薄膜型コイル部品7にマーキング8を付与するために、マーキング8の印刷や焼付けの工程が必要となり、薄膜型コイル部品7の製造コストが高くなるという問題があった。また、マーキング8の材料中にカーボンや金属等が含有されていると、図12に示すように、マーキング8によりコイル3によって発生する磁束が遮断され、薄膜型コイル部品7のインダクタンス値が小さくなるという問題があった。

【0008】他方、左側のウインドウW_a内のコイルパターン2の本数と右側のウインドウW_b内のコイルパターン2の本数とを比較する図11の方法では、図13に示すように、コイル3のターン数が多くなればなるほど、また、薄膜型コイル部品7の形状が小さくなればなるほど、左側のウインドウW_a内の白ピクセル（もしくは黒ピクセル）の数と右側のウインドウW_b内の白ピクセル（黒ピクセル）の数との差が小さくなり、薄膜型コイル部品7の方向性の判定が困難になり、方向性判定の信頼性が低下するという問題があった。

【0009】そこで、本発明の目的は、特性の劣化なしに方向性を容易に識別することができる薄膜型コイル部品及びその方向性認識方法を提供することにある。

【0010】

【課題を解決するための手段】前記目的を達成するため、本発明に係る薄膜型コイル部品は、絶縁基板上にコイルパターンを形成してコイルを構成し、該コイルの二つの引出し部がそれぞれ前記絶縁基板の二つの端部に引き出されると共に、前記引出し部のいずれか一方が前記絶縁基板の対称軸にて二つに仕切られた一方の側に偏在していることを特徴とする。あるいは、絶縁基板上にコイルパターンを形成してコイルを構成し、該コイルの二つの引出し部がそれぞれ前記絶縁基板の二つの端部に引き出されると共に、前記絶縁基板の対称軸にて二つに仕切られた一方の側に配設された前記引出し部のパターン面積と他方の側に配設された前記引出し部のパターン面積とを異ならせたことを特徴とする。そして、これらの薄膜型コイル部品の方向性認識方法は、引出し部に光を照射してその反射光から前記引出し部を検出し、その位置に基づいて薄膜型コイル部品の方向性を認識することを中心とする。

【0011】また、本発明に係る薄膜型コイル部品は、絶縁基板上にコイルパターンを形成してコイルを構成し、該コイルの二つの引出し部がそれぞれ前記絶縁基板の二つの端部に引き出されると共に、前記絶縁基板の対称軸にて二つに仕切られた一方の側に配設された引出し部の近傍に認識用ダミー電極を設けたことを特徴とする。そして、この薄膜型コイル部品の方向性認識方法は、認識用ダミー電極に光を照射してその反射光から前記認識用ダミー電極を検出し、その位置に基づいて薄膜型コイル部品の方向性を認識することを中心とする。

【0012】

【作用】コイルの引出し部や認識用ダミー電極に光が入射すると、その光が効率良く反射される。従って、引出し部や認識用ダミー電極から戻る光が他の領域から戻る光の量よりも多く、これを撮像すれば、引出し部や認識用ダミー電極の領域の画像が他の領域の画像に比べ輝度が高く、明るくなる。これを検知することにより引出し部や認識用ダミー電極の位置を検出し、絶縁基板の対称軸に対する引出し部や認識用ダミー電極の位置関係から、薄膜型コイル部品の方向性を識別することができる。

【0013】

【発明の実施の形態】以下、本発明に係る薄膜型コイル部品及びその製造方法の実施の形態について添付の図面を参照して説明する。各実施形態において、同一部品及び同一部分には同じ符号を付した。

【0014】〔第1実施形態、図1～図3〕第1実施形態は、認識用ダミー電極を設けた薄膜型コイル部品について説明する。図1に示すように、薄膜型コイル部品21は、絶縁基板1上に、例えばフォトリソグラフィ法によりコイルパターン2と透明（あるいは半透明）な絶縁樹脂層6とを交互に形成し、該コイルパターン2により形成されるスパイラル状のコイル3の一端部3a（コイル3とは絶縁されている。）及び他端部3bが絶縁基板1の両端部にそれぞれ形成された端子4及び5に引き出されてなるものである。絶縁樹脂層6上には、絶縁基板1の一つの対称軸9aに関して右側の領域内に認識用ダミー電極22を形成している。絶縁基板1の材料としては、ガラス、ガラスセラミックス、アルミナ、フェライト等が使用される。コイル3や認識用ダミー電極22の材料としては、Ag、Ag-Pd、Cu、Ni等が使用される。

【0015】薄膜型コイル部品21は、例えば次のようにして形成することができる。絶縁基板1の上面にスパッタリングによる電極膜を形成し、感光性のレジストを塗布した後、所定の画像パターンが形成されたフォトマスクを重ねて露光し、現像することによりスパッタ電極膜上にコイルパターン形状のレジスト膜を残す。さらに、エッチングにより余分なスパッタ電極膜を除去し、さらにレジスト膜を剥離することにより所望のコイルパターン2を形成する。次に、絶縁樹脂層6を、コイルパターン2を形成した場合と同様にフォトリソグラフィ法により形成する。すなわち、液状の絶縁性材料を絶縁基板1の上面の全面に塗布、乾燥して絶縁樹脂層6を形成する。絶縁性材料には、例えば感光性ポリイミド樹脂等のフォトリソグラフィ法に適した材質のものが使用される。次に、絶縁樹脂層6の上面に所定の画像パターンが形成されたマスクフィルムを被せ、紫外線等を照射する等の露光工程で、絶縁樹脂層6の所望の部分を変硬化させる。次に、現像工程で絶縁樹脂層6の未硬化部分を除去し、コイルパターン2を層間接続するための開口部等を

形成する。

【0016】以下同様にして、コイルパターン2と絶縁樹脂層6(6a, 6b)を必要により交互にフォトリソグラフィ法により形成する。このとき、最外層のコイルパターン2を形成する際に使用するフォトマスクに、認識用ダミー電極22を形成するための画像パターンを形成しておけば、現像工程を経ることにより、図2に拡大して示すような認識用ダミー電極22を形成することができる。

【0017】図3に図式的に示すように、絶縁樹脂層6aの上面に認識用ダミー電極22が形成された薄膜型コイル部品21の表面に光を照射すると、認識用ダミー電極22にて光が効率良く反射される。このため、図1の薄膜型コイル部品21をCCDカメラ等で撮像すると、その画像は認識用ダミー電極22の領域の輝度が高く、その他の領域の輝度が低くなる。この輝度の差から認識用ダミー電極22を検出することができる。従って、検出した認識用ダミー電極22が絶縁基板1の対称軸9aにより仕切られる二つの領域のうちのいずれの領域に位置しているかを判定することにより、薄膜型コイル部品21の方向性を知ることができる。

【0018】次に、その具体的な方向の識別方法を説明する。まず、図1に示す薄膜型コイル部品21をCCDカメラにより画像処理装置に取り込み、該画像処理装置に取り込まれた画像を2値化処理する。そして、2値化処理された画像の長手方向に走る対称軸9aの左側及び右側にそれぞれ同じ面積を有するウインドウWa及びWb(図1参照)を設定する。なお、これらウインドウWa及びWbは、その一つのウインドウWbに、認識用ダミー電極22の画像が含まれるように設定する。

【0019】次いで、二つのウインドウWa及びWb内の白ピクセルの数及び黒ピクセルの数をそれぞれカウントする。このとき、認識用ダミー電極22の画像を含むウインドウWbでは、認識用ダミー電極22からのCCDカメラに入射する光の量が多い分、黒ピクセルの数が少なく、白ピクセルの数が多くなっている。いま、ウインドウWa内の白ピクセルのカウント値をWapとし、ウインドウWb内の白ピクセルのカウント値をWbpとすると、以下に示す方向性認識演算により、図1の薄膜型コイル部品21の方向性を識別することができる。すなわち、 $Wbp - Wap > 0$ のときは、コイル部品21は順方向に配置されている、 $Wbp - Wap < 0$ のときは、コイル部品21は逆方向に配置されていると判定される。なお、この判定結果は、図1の薄膜型コイル部品21の二つの端子4及び5のいずれをコイル3の巻始めと決めるかにより、順方向と逆方向とを互に入れ替えることもできる。

【0020】以上のように、認識用ダミー電極22を形成しているため、2値化画面に設定したウインドウWa内の白ピクセルのカウント数Wapと、ウインドウWb

内の白ピクセルのカウント数Wbpとの間に大きな差を持たせることができる。これにより、方向性判定のための特別な工程や材料を必要とせず、簡単かつ高い信頼性を有して薄膜型コイル部品21の方向性を認識することができる。

【0021】[第2実施形態、図4～図6] 第2実施形態は、コイルの一方の引出し部が絶縁基板の対称軸にて二つに仕切られた一方の側に偏在している薄膜型コイル部品について説明する。

【0022】図4に示した薄膜型コイル部品31は、絶縁基板1上に、例えばフォトリソグラフィ法によりコイルパターン2と透明な絶縁樹脂層6とを交互に形成し、該コイルパターン2により形成されるスパイラル状のコイル3の一端部3a(コイル3とは絶縁されている。)及び他端部3bが絶縁基板1の両端部にそれぞれ形成された端子4及び5に引き出されてなるものである。コイル3の端部3bは、絶縁基板1の対称軸9aにて左右二つに仕切られた左側の領域内に形成されている。

【0023】また、図5に示した薄膜型コイル部品41は、コイル3の端部3bが、絶縁基板1の対称軸9aにて左右二つに仕切られた右側の領域内に形成されている。さらに、図6に示した薄膜型コイル部品51は、前記薄膜型コイル部品31において、コイル3の端部3bのパターン面積を広くしたものと同様のものである。

【0024】これらの薄膜型コイル部品31, 41, 51の表面に光を照射すると、コイル3にて光が効率良く反射される。このため、これらの薄膜型コイル部品31, 41, 51をCCDカメラ等で撮像すると、その画像はコイル3の領域の輝度が高く、その他の領域の輝度が低くなる。従って、対称軸9aの左側及び右側にそれぞれ同じ面積を有するウインドウWa及びWb(図4, 図5, 図6参照)を、その一つのウインドウWa又はWbに端部3bの画像が含まれるように設定することにより、輝度の差から端部3bを検出することができる。こうして検出した端部3bが絶縁基板1の対称軸9aにより仕切られる二つの領域のうちのいずれの領域に位置しているかを判定することにより、薄膜型コイル部品31, 41, 51の方向性を知ることができる。この場合も、薄膜型コイル部品31, 41, 51の方向性認識のためのアルゴリズムは前記第1実施形態と全く同様である。

【0025】[第3実施形態、図7] 図7に示すように、第3実施形態の薄膜型コイル部品61は、コイル3の端部3a, 3bのそれぞれのパターン面積を異ならせたものである。パターン面積の広い端部3bは絶縁基板1の短辺方向の対称軸9bにて上下二つに仕切られた下側の領域内に配設され、パターン面積の狭い端部3aは上側の領域内に配設されている。

【0026】この薄膜型コイル部品61の表面に光を照射すると、コイル3にて光が効率良く反射される。この

ため、薄膜型コイル部品61をCCDカメラ等で撮像すると、その画像はコイル3の領域の輝度が高く、その他の領域の輝度が低くなる。従って、対称軸9bの上側及び下側にそれぞれ同じ面積を有するウインドウWc及びWdを、その一つのウインドウWdに端部3bの画像が含まれるように設定することにより、輝度の差から端部3bを検出することができる。こうして検出した端部3bが絶縁基板1の対称軸9bにより仕切られる二つの領域のうちのいずれの領域に位置しているかを判定することにより、薄膜型コイル部品61の方向性を知ることができる。この場合も、薄膜型コイル部品61の方向性認識のためのアルゴリズムは前記第1実施形態と全く同様である。

【0027】〔他の実施形態〕なお、本発明は、前記実施形態に限定されるものではなく、その要旨の範囲内で種々に変更することができる。例えば前記実施形態では、コイル3の端部3bや認識用ダミー電極22の画像を含むウインドウWaあるいはWbでは、端部3bや認識用ダミー電極22からCCDカメラに入射する光の量が多い分、黒ピクセルの数が少なく、白ピクセルの数が多くなっているが、CCDカメラにより取り込んだ前記画像の2値化処理を逆転することにより、前記端部3bや認識用ダミー電極22の画像を含むウインドウWaあるいはWbの黒ピクセルの数が多く、白ピクセルの数が少なくなるようにすることもできる。このときは、前記方向性判定演算において、WapをウインドウWa内の黒ピクセルのカウント数、WbpをウインドウWb内の黒ピクセルのカウント数とすればよい。

【0028】また、前記実施形態は、フォトリソグラフィ法によりコイルパターン2と絶縁樹脂層6とを交互に形成しているが、必ずしもこれに限るものではなく、厚膜印刷法、スパッタリング法、真空蒸着法等の方法を用いてもよい。さらに、コイル3の端部3bや認識用ダミー電極22が絶縁樹脂層6から露出している構造であれば、必ずしも絶縁樹脂層6は透明な材料あるいは半透明な材料である必要はない。

【0029】

【発明の効果】以上の説明から明らかなように、本発明は、薄膜型コイル部品のコイルの引出し部や認識用ダミー電極に光を照射して、その位置を検知して絶縁基板の対称軸に対する引出し部や認識用ダミー電極の位置関係から、薄膜型コイル部品の方向性を識別するようにしたので、方向性判定のための特別なマーキング用の材料が

不要で、コイルの巻数が多いものやコイルパターンの密度が高いものであっても、方向性の認識が容易でその認識の信頼性も高く、コストの低い薄膜型コイル部品を得ることができる。また、本発明によれば、方向性判定のためのマーキングによる薄膜型コイル部品の磁束の遮断に伴うインダクタンスの低下といった従来の薄膜型コイル部品が有していた特性上の問題も解消することができる。

【図面の簡単な説明】

【図1】本発明に係る薄膜型コイル部品の第1実施形態を示す平面図。

【図2】図1に示した薄膜型コイル部品のウインドウ内の画像を示す説明図。

【図3】図1に示した薄膜型コイル部品の構造を示す模式図。

【図4】本発明に係る薄膜型コイル部品の第2実施形態を示す平面図。

【図5】本発明に係る薄膜型コイル部品の第2実施形態の別の実施例を示す平面図。

【図6】本発明に係る薄膜型コイル部品の第2実施形態のさらに別の実施例を示す平面図。

【図7】本発明に係る薄膜型コイル部品の第3実施形態を示す平面図。

【図8】従来の薄膜型コイル部品の平面図。

【図9】方向性識別のためのマーカを有する従来の薄膜型コイル部品の平面図。

【図10】方向性識別のためのマーカを有するいま一つの従来の薄膜型コイル部品の平面図。

【図11】図8に示した薄膜型コイル部品の方向性認識方法の説明図。

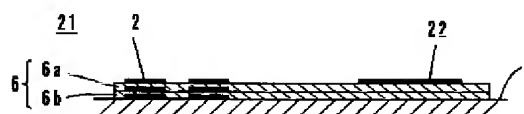
【図12】従来の薄膜型コイル部品の問題点の説明図。

【図13】従来の薄膜型コイル部品の問題点の説明図。

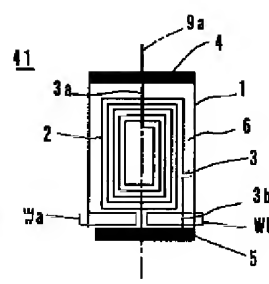
【符号の説明】

- 1…絶縁基板
- 2…コイルパターン
- 3…コイル
- 3a, 3b…端部
- 6…絶縁樹脂層
- 9a, 9b…対称軸
- 21, 31, 41, 51, 61…薄膜型コイル部品
- 22…認識用ダミー電極
- Wa, Wb, Wc, Wd…ウインドウ

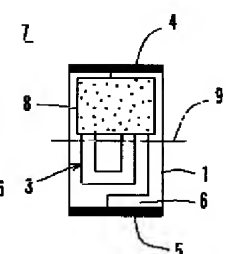
【図3】



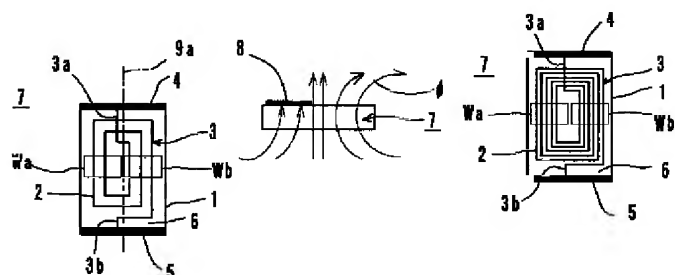
【图5】



【图 10】



【例 13】



【特許請求の範囲】

【請求項2】 絶縁基板上にコイルパターンを形成して

コイルを構成してなる薄膜型コイル部品の方向性認識方法において、
前記薄膜型コイル部品の前記コイルの二つの引出し部がそれぞれ前記絶縁基板の二つの端部に引き出されると共に、前記絶縁基板の二つの端部の一方から他方に向かう方向に対して直交する前記絶縁基板の対称軸にて二つに仕切られた一方の側に配設された前記引出し部のパターン面積と他方の側に配設された前記引出し部のパターン面積とを異ならせ、前記引出し部に光を照射してその反射光から前記引出し部を検出し、その位置に基づいて薄膜型コイル部品の方向性を認識することを特徴とする薄膜型コイル部品の方向性認識方法。

【手続補正3】

【補正対象書類名】明細書

【補正対象項目名】0001

【補正方法】変更

【補正内容】

【0001】

【発明の属する技術分野】本発明は、薄膜型コイル部品の方向性認識方法に関する。

【手続補正4】

【補正対象書類名】明細書

【補正対象項目名】0009

【補正方法】変更

【補正内容】

【0009】そこで、本発明の目的は、特性の劣化なしに方向性を容易に識別することができる薄膜型コイル部品の方向性認識方法を提供することにある。

【手続補正5】

【補正対象書類名】明細書

【補正対象項目名】0011

【補正方法】削除

【手続補正6】

【補正対象書類名】明細書

【補正対象項目名】0012

【補正方法】変更

【補正内容】

【0012】

【作用】コイルの引出し部に光が入射すると、その光が効率良く反射される。従って、引出し部から戻る光が他の領域から戻る光の量よりも多く、これを撮像すれば、引出し部の領域の画像が他の領域の画像に比べ輝度が高く、明るくなる。これを検知することにより引出し部の位置を検出し、絶縁基板の対称軸に対する引出し部の位置関係から、薄膜型コイル部品の方向性を識別することができる。

【手続補正7】

【補正対象書類名】明細書

【補正対象項目名】0013

【補正方法】変更

【補正内容】

【0013】

【発明の実施の形態】以下、本発明に係る薄膜型コイル部品の製造方法の実施の形態について添付の図面を参照して説明する。各実施形態において、同一部品及び同一部分には同じ符号を付した。

【手続補正8】

【補正対象書類名】明細書

【補正対象項目名】0029

【補正方法】変更

【補正内容】

【0029】

【発明の効果】以上の説明から明らかなように、本発明は、薄膜型コイル部品のコイルの引出し部に光を照射して、その位置を検知して絶縁基板の対称軸に対する引出し部の位置関係から、薄膜型コイル部品の方向性を識別するようにしたので、方向性判定のための特別なマーキング用の材料が不要で、コイルの巻数が多いものやコイルパターンの密度が高いものであっても、方向性の認識が容易でその認識の信頼性も高く、コストの低い薄膜型コイル部品を得ることができる。また、本発明によれば、方向性判定のためのマーキングによる薄膜型コイル部品の磁束の遮断に伴うインダクタンスの低下といった従来の薄膜型コイル部品が有していた特性上の問題も解消することができる。